PATENT ABSTRACTS OF JAPAN

(54) DIGITAL BROADCAST RECEPTION SYSTEM IN INFORMATION PROCESSER

(57)Abstract:

PROBLEM TO BE SOLVED: To allow a CPU of a computer to facilitate packet processing by using a PID to filter a packet of an MPEG2 transport stream that is a digital broadcast received signalgiving the filtered packet to an FIFO memory and allowing a DMA controller to apply DMA transfer to a system memory via a host bus of the computer.

SOLUTION: A CPU 13 of a personal computer 18 sets a tuner section 2 of a digital satellite broadcast such as changeover of a transponder of a satellite to demodulate and corrects an error of a radio wave received by a parabolic antenna 1 to provide an output of an MPEG 2 transport stream. In the case of a pay broadcasta descrambling section 3 converts the stream into an MPEG2 transport stream that is descrambled. In this casea key to release scrambling is controlled by the CPU 13 from the system memory 8 of the personal computer 18 and data are sent to the descrambling section 3.

CLAIMS

[Claim(s)]

[Claim 1]In a system for carrying out digital-satellite-broadcasting reception in information processorssuch as a computerMPEG(Moving Picture Experts Group) 2 transport stream outputted from a digital-satellite-broadcasting tuner partAfter canceling scramble in the case of paid broadcastingin order to carry out facilitating of the section formation from a packet of an MPEG2 transport stream by CPU of a computerA means which carries out a filter by ID of a packetand a buffer memory stored until a host bus can access output data by which the filter was carried outA digital broadcasting receiving system in an information processor provided with a DMA control means for carrying out DMA (Direct Memory Access)

transmission of the contents of said buffer memory to a system memory via said host bus.

[Claim 2]In order to read data for carrying out a releasing scramble from an IC cardAn I/O-hardware-control part which write data from said host bus in order to send data for the contents of said system memory to said IC card by said CPUThe 2nd buffer memory for storing temporarily data sent to said IC cardA RS-232C control means for transmitting data for the contents of said buffer memory to an IC card via an IC card interfaceAfter sending data to a preparation and said IC carddata for canceling scramble via said IC card interfaceCollect data which was read by said RS-232C control meansand was read by said RS-232C control means until it can perform access of said host bus in said 2nd buffer memoryand via said I/O-hardware-control meansData of a releasing scramble read to said system memory via said host bus in the contents of said 2nd buffer memory. Cancel scramble of paid broadcasting of digital satellite broadcasting of said host bus by writing in data to said crumble release part via said I/O-hardware-control means. A digital broadcasting receiving system in an information processor characterized by things.

[Claim 3]A digital broadcasting receiving system in the information processor according to claim 1 or 2wherein said each buffer memory consists of a FIFO (First In First Out) type memory.

[Claim 4]An MPEG 2 transport stream packet of which scramble was canceledIt is set as ID of an image and a sound as ID of a packet of the MPEG2 transport stream according to claim 1Carry out a DMA transfer to a system memory of a computerand PES (Packetized ElementaryStream) of MPEG 2 of an image and a sound is created by a packet transmitted to a system memory by CPU of a computerDecode by said CPUtransmit a decoded result of an image to a picture display part of a computerand an image is displayed on a displayA digital broadcasting receiving system in an information processor characterized by what an audio decoded result is transmitted to a sound reproduction section of a computerand a sound is sounded for from a speaker.

[Claim 5]It is said filter of the MPEG2 transport stream according to claim 1 about an MPEG 2 transport stream packet characterized by comprising the following of which scramble was canceled.

Have a filter of a packet of an image and a sound for exclusive useand a filter of said image and a soundOnly a PES (Packetized Elementary Stream) portion is passedThe output is stored to an MPEG 2 transport stream bufferTransmit and decode a stream to an MPEG2 decoder and a decoded result of an imageIn [transmit to a picture display part of a computer display an image on a displaytransmit an audio decoded result to a sound reproduction section of KOMPYOTAoutput as a sound from a speakerand] said filter in that caseIn order to set a clockan encoder clock by the side of a broadcasting stationand decoding of a receiverAn PCR value to which filtering of the data of PCR (Program Clock Reference; program time reference value) was carried outand filtering of the VCO control part was carried out in a filter of an MPEG2 transport stream.

A means to take difference of counted value of a decoding clock supplied to said MPEG2 decoderto adjust so that both value may suitand to adjust a clock frequency of an MPEG2 decoder from VCO (voltage controlled oscillator).

[Claim 6]By transposing said digital-satellite-broadcasting tuner to a terrestrial digital-TV-broadcasting tunerand transposing an MPEG2 decoder to a thing also corresponding to high resolution of a Hi-Vision classA digital broadcasting receiving system in the information processor according to claim 5 characterized by enabling it to view and listen to terrestrial digital TV by said computer.
[Claim 7]A system characterized by comprising the following for carrying out digital-satellite-broadcasting reception in information processorssuch as a computer.
MPEG(Moving Picture Experts Group) 2 transport stream outputted from a digital-satellite-broadcasting tuner partA filter means which extracts a packet which is in agreement with packet ID (PID) specified beforehand from an MPEG2 transport stream which was outputted from a releasing scramble part which carries out a releasing scramble in the case of paid broadcasting.
A DMA control means for carrying out DMA (DirectMemory Access) transmission of the contents of a buffer memory which accumulates temporarily a packet outputted from said filter meansand said buffer memory at a memory by the side of a computer.

[Claim 8]An IC card interface for accessing an IC cardsaid IC card interfaceand a communication control means that performs communication of dataIt has an I/O-hardware-control means to access from CPU of said computerData of said IC card is read via said IC card interfaceA signal for supplying key data for being incorporated into a memory by the side of said computer via said communication control means and said I/O-hardware-control meansand carrying out a releasing scramble to said releasing scramble partReading and writing of an IC card at the time of a control signal for controlling said tuner part being outputted from said I/O-hardware-control meanshaving the 2nd buffer memory between said communication control means and said I/O-hardware-control meansand receiving paid broadcastingA digital broadcasting receiving system in the information processor according to claim 7 with which control of release of scramble is characterized by what is controlled by CPU of said computer.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]This invention relates especially to the disposal method of received data about the digital broadcasting receiving system in information processorssuch as a computer.

[0002]
[Description of the Prior Art]Publicly known document of the following description for exampleis referred to as this kind of conventional technology.
(1) JPH08-307784A(2) JPH08-237154A(3) JPH05-328320A.
[0003]Conventionallythe method of connection in case a personal computer receives terrestrial TV broadcast reception of an analog is indicated by JPH08-307784Afor example as a receiving method of the TV broadcast in this kind of personal computer. In this casesince the video signal / audio signal / data signal / control signal has appeared in the output of the broadcast receiving cardif it is easily connected with the circuit inside a personal computera personal computer can be easily used as the terrestrial V receiving system of an analog. Howeverin the case of digital broadcastingsince the receiving method of broadcast differs from an analog formit cannot constitute easily at this appearance.
[0004]To JPH08-237154A. Since the digital output of a tuner can be directly incorporated into a personal computer by connecting the tuner card part for digital broadcasting to a personal computerit is indicated that digital broadcasting is easily receivable with a personal computerbut. In this compositionpaid broadcasting is unreceivable.
[0005]In the case of digital satellite broadcastingan IC card is needed in order to receive paid broadcasting. The system configuration of the conventional common digital satellite broadcasting receiver is shown in drawing 11. In drawing 1101 is shown and a parabolic antenna the digital satellite broadcasting receiver 119It has the digital-satellite-broadcasting tuner part 102the releasing scramble part 103the transport stream decoder 105DRAM104MPEG2 decoder 106SDRAM107the video encoder 108and audio D/A converter 109The computer side is provided with the microcomputer 112ROM113DRAM114the network control 118 that controls connection of a telephone linethe modem 117the remote control/panel control part 111and the IC card I/F (interface) part 116The microcomputer 112 performs transfer of the transport stream decoder 105the releasing scramble part 103and data via the system bath 110.
[0006]When drawing 11 is referred toin order to view and listen to paid broadcastingin this conventional systemIC card 115 for exclusive use is needed. The information on the channel of paid broadcasting that he made a contract of an IC cardetc. are memorized.
In order to view and listen to paid broadcastingit is always needed.
The conventional digital satellite broadcasting receiver is a thing of a 16-bit microcomputeris controlledand performs the releasing scramble of paid broadcastingetc. LSI of hardware for exclusive use is used for decoding of the transport stream of MPEG 2and it has become it with the composition of performing section formation of a packetby the memory connected or built in this.
[0007]To JPH05-328320A. Although the composition which incorporated the text for teletext into the personal computer with a RS-232C interface is indicated in the data of the teletext of analog terrestrial TV broadcast like JPH08-307784Ait is not a thing corresponding to digital broadcasting.

[0008]

[Problem(s) to be Solved by the Invention]As described abovethe conventional system has a problem of the following description.

[0009]The 1st problem is that MPEG 2 transport stream decoder LSI for exclusive use and the memory in which it is connected or built by it are performing section formation of the packet of an MPEG2 transport stream.

[0010]The Reason is because the throughput of the microcomputer which is controlling the whole does not have only the performance which carries out section formation.

[0011]In order to cancel the scramble for receiving the paid broadcasting of digital satellite broadcastingthe 2nd problemIt is that take out the code for canceling the scramble currently written in the IC cardand the microcomputer is performing processing in which the packet to which the scramble of the MPEG2 transport stream outputted from a digital tuner was applied is canceled.

[0012]The Reason is because cost will become high if it manages by processors other than a microcomputersince the whole digital satellite broadcasting receiver is managed with the microcomputer.

[0013]The 3rd problem is needing MPEG2 decoder LSI of hardware constitutionsin order to decode the image and sound into which the digital satellite broadcasting receiver is compressed.

[0014]The Reason is because the performance of the microcomputer which is controlling the receiver does not have capability (performance) to the extent that MPEG 2 decoding can be processed. Even if a processor with high performance comes outonce a product will be shippedwhen a processor with high performance comes out laterthere is also a problem [say / that exchange is easily impossible].

[0015]Thereforethis invention is made in view of the above-mentioned problemand the purposeIn the digital broadcasting receiving set in an information processorto section formation of the packet of an MPEG2 transport stream. Make it unnecessary to use LSI for exclusive useand it ends with minimum hardware for CPU of a computer to perform section formationBy making it not require to use a microcomputer for exclusive use to the control of which scramble required for paid broadcasting reception is canceledand constituting from minimum hardware so that it can control by CPU of a computerIt is in providing the digital broadcasting receiving set which harnessed the processing performance of CPU of a computer in the maximum.

[0016]

[Means for Solving the Problem]In order to attain said purposea digital broadcasting receiving system in an information processor of this invention carries out the filter of the transport stream of MPEG 2and is provided with a means which carries out a DMA transfer to a system memory of a computer.

[0017]This invention equips details with a means which carries out a filter by packet ID (PID) which specified an MPEG2 transport stream outputted from a releasing scramble part moreIt has a DMA control means (DMA controller) for transmitting an output which carried out the filter to a system memory of a

computerIt has a FIFO (First In First Out; first-in first-out) memory between a filter means and a DMA control means supposing a case where a bus of a computer is crowded.

[0018]This invention is provided with a means to access an IC card from CPU of a computerand a means to access a releasing scramble part.

[0019]So that details may be equipped more with a RS-232C control section which performs communication of an IC card interface for accessing an IC cardand data in this invention and it can access from CPU of a computerIt has an I/O-hardware-control part and a signal for controlling a signal and a tuner which can access a releasing scramble part by an I/O-hardware-control part is established.

[0020]Access of an IC card is provided with a FIFO memory between a RS-232C control section and an I/O-hardware-control partin order to make load light for a bus of a computer at the time of access of an IC cardsince the data transfer rate is dramatically slow compared with data transfer ability of a bus of a computer.

[0021][Function] —— the digital broadcasting receiving system in the information processor of the present inventionScramble is canceled at the time of the paid broadcasting which scramble has required in the releasing scramble part in the MPEG2 transport stream outputted from a digital tuner partand when that is not rightit outputs through as it is.

[0022]The filter of the MPEG2 transport stream outputted from this releasing scramble part is carried out by PID in the packet concernedonly its packet needed is taken outand a DMA transfer is performed to the system memory of a computer through a FIFO memory by a DMA controller.

[0023]Since only the same packet is transmitted to a system memory by such compositionCPU of a computer can perform processing which forms the sent-out original section while looking at the header of a packetwithout seldom applying the CPU load of a computer.

[0024]In receiving paid broadcastingonly the part which balances the capacity of a FIFO memory via an I/O-hardware-control part in the data which carried out section formation transmits dataand it a FIFO memoryData is transmitted to a RS-232C control sectionit changes into serial data by a RS-232C control sectionand data is transmitted to an IC card interface.

[0025]Although an IC card interface transmits data to an IC cardSince access of an IC card is half duplexonly a data number required for an IC card is transmittedand after sending out all the dataan IC card interface reads data from an IC card after process delay in an IC card.

[0026]This read data is changed into parallel data by a RS-232C control sectionand data is transmitted to a FIFO memory. If data goes into a FIFO memoryan interrupt signal will be published to a computer and a computer will read data included in a FIFO memory to a system memory via an I/O-hardware-control part. CPU of a computer outputs data read from this IC card to a releasing scramble part via an I/O-hardware-control partand scramble can be canceled in a releasing scramble part.

[0027]Thusaccording to this inventionit can perform performing a releasing

scramble for paid broadcasting reception from section formation by CPU of a computer.

[0028]

[Embodiment of the Invention]Nextthis invention is explained in detail with reference to Drawings about an embodiment.

[0029]Drawing 1 is a figure showing the composition of an embodiment of the invention. When drawing 1 is referred toin an embodiment of the invention the digital-satellite-broadcasting receive section 7The parabolic antenna 1 receives the electric wave of digital satellite broadcastingby the digital-satellite-broadcasting tuner part 2the recovery and error correction which return selection and the electric wave of a transponder to the original digital signal are performedand an MPEG2 transport stream is outputted. At this timethe control terminal of the digital-satellite-broadcasting tuner part 2 is connected to a filter and the host bus control section 4.

[0030]Nextit lets the releasing scramble part 3 passand an MPEG2 transport stream is transmitted to a filter and the host bus control section 4. The key data for canceling scramble is sent to the scramble control section 3 from a filter and the host bus control section 4.

[0031]A filter and the host bus control section 4 equip the IC card I/F (interface) part 6 for accessing IC card 5 with the interface for communicating dataand connect it to the host bus of the personal computer 18It is constituted so that it can access from CPU13 of the personal computer 18.

[0032]The digital-satellite-broadcasting receive section 7 of composition of having described above is connected to the host bus 14 of the personal computer 18.

[0033]The personal computer 18 is generally with CPU13the host bus 14and the control section 9 that controls the system memory 8By the picture display part 10 which processes data and is connected to the host bus 14. Display a picture on the display devices 15such as CRTor a sound is sounded with the speaker 16 by the sound reproduction section 11 connected to the host bus 14or it connects with the telephone line 17 by the modem section 12 connected to the host bus 14and data communications become possible.

[0034]Operation of an embodiment of the invention is explained in detail with reference to drawing 1 thru/or drawing 5. Drawing 2 is a block diagram showing the composition of the filter in an embodiment of the inventionand the host bus control section 4. Drawing 3 is an explanatory view for explaining the principle of the filter in an embodiment of the invention. Drawing 4 is a figure for explaining operation of the filter in an embodiment of the invention. Drawing 5 is a flow chart for explaining the process flow which cancels the scramble of paid broadcasting in an embodiment of the invention.

[0035]Firstin the tuner part 2 of digital satellite broadcasting. Tunerssuch as a change of the transponder of a satelliteare set up for the electric wave received with the parabolic antenna 1 by CPU13 of the personal computer 18a recovery and an error correction are performedand the transport stream of MPEG 2 is outputted. At this timesince scramble is not canceledthe channel of paid

broadcasting is changed into the MPEG2 transport stream which canceled scramble in the case of paid broadcasting in the releasing scramble part 3. The key for canceling scramble at this time is controlled by CPU13 from the system memory 8 of the personal computer 18and data is sent out to the releasing scramble part 3.

[0036]If drawing 2 is referred toMPEG2 transport stream 39 outputted in the releasing scramble part 3It is filtered by ID of the packet beforehand set up by the program of CPU13 to carry out a filter with a filter and the transport stream filter 33 of the host bus control section 4.

[0037]With reference to drawing 3operation of a filter is explained more to details. An MPEG2 transport stream is constituted by the transport packet of 188 byte fixed lengthand a transport packetA synchronous bytean error indication (the existence of an error indicator and the bit error in this is shown)Unit start identification (it is shown that new PES begins from the pay load of this transport packet)A transport packet priorityPID (for Packet Identification and 13-bit stream identification information.) the individual stream attribute of an applicable packet is shown -- scramble control (2 bits -- the existence of the scramble of the pay load of this packet.) classification is shown -- adaptation field control (the existence of the adaptation field in this packet.) And it consists of the round counter (it is the information for detecting whether the packet with the same PID was rejected in part on the wayand is a 4-bit round counter) and pay load (184 bytes) which show the existence of a pay load.

[0038]When drawing 3 is referred toa filter looks at the bit which shows ID of the packet called "PID" of an MPEG2 transport streamand the value of the PID by CPU13. It comprises the filter block 50 which consists of the comparator 52 which compares the value of the register 51 (PID register over which a filter is covered) in which the value of PID to filter beforehand was set upoutputs "1" when in agreementand outputs "0" when inharmonious.

[0039]It is good also as composition which uses two or more filter blocks 50 at this timeand carries out the filter of two or more PID simultaneously at it. In this caselogical sum is taken by OR gate 53and let the output of the filter block 50 be a filter output.

[0040]It opts for operation of the filter of a packet according to the state of the signal outputted from the filter. If an output signal is set to Ywhen Y is "0"a packet will be disregardeda packet will be discardedand the transport stream filter 33 will be operated so that a packet may be transmitted to FIFO memory 34 of drawing 2when Y is "1."

[0041]The DMA transfer of the data transmitted to FIFO memory 34 is carried out by the direct memory access control 35 to the system memory 8 of the personal computer 18.

[0042]The filter operation is shown in drawing 4. That isthe same PID packet (transport packet) with a value of PID equal to the preset value of the register 51 is extracted from an MPEG2 transport stream.

[0043]Since the filter only of the packet in which the packet transmitted to the

system memory 8 had the demand by the program of CPU13 is carried outonly a packet needed will be transmitted to the system memory 8 by a program.

[0044]Since the packet is continuing seeing the data transmitted to this system memory 8the program executed by CPU13 becomes possible [doing easily the work of the section formation returned to the original section].

[0045]If the destination address of the system memory 8 when transmitting by a DMA transfer is changed when a filter is carried out by two or more PIDit can transmit without losing the continuity of the same packet.

[0046]Nextoperation when receiving paid broadcasting is explained with reference to the flow chart of drawing 5.

[0047]When receiving paid broadcasting firstit is necessary to make a contract the offer origin of paid broadcasting a prioriand to write in EMM (Entitlement ManagementMessage) data to an IC card (Step 501 of drawing 5). The contract information of paid broadcasting is contained in this EMM dataand if a customer makes a contracta broadcasting station will carry and send out EMM data to the transport packet of MPEG 2 using a satellite. For this reasonby a programthe filter of the EMM data is carried out and it is extracted.

[0048]And the extracted EMM data is sent out to FIFO memory 31 via the I/O-hardware-control part 32 of drawing 2 via the host bus 14.

[0049]And with reference to drawing 2by the RS-232C control section 30the data from FIFO memory 31 is changed into serial datathrough the IC card I/F part 6 of drawing 1is written in IC card 5 as EMM dataand is put on it.

[0050]Unless it does this workkey information for canceling scramble of IC card 5 cannot be read.

[0051]The ID information according to card individual included in IC card 5 is read in the IC card I/F part 6and it changes into a parallel signal via the RS-232C control section 30and transmits to FIFO memory 31.

[0052]FIFO memory 31 will generate interruption to CPU13if data entersand according to this interruptionCPU13 is a program and transmits the data included in FIFO memory 31 to the system memory 8 via the host bus 14 by the I/O-hardware-control part 32.

[0053]The ID information of this IC card 5 is beforehand set as the releasing scramble part 3 by the I/O-hardware-control part 32 via the host bus 14. It is necessary to perform the above thing by initial setting beforehand.

[0054]NextECM (Entitlement Control Message) data is received (Step 502 of drawing 5). Data required in order to extract the key for canceling the scramble of paid broadcasting from an IC card is contained in this ECM dataand ECM dataSince a broadcasting station is carried and sent out to the transport packet of MPEG 2 at the time when the broadcast is performed for every program of paid broadcasting using a satelliteby a programthe filter of the ECM data is carried out and it is extracted.

[0055]The extracted ECM data is sent out to FIFO memory 31 via the I/O-hardware-control part 32 of drawing 2 via the host bus 14. The data from FIFO memory 31 is changed into serial data by the RS-232C control section 30and is

written in IC card 5 as ECM data through the IC card I/F part 6 by it (Step 503 of drawing 5).

[0056]Thensince the key data for canceling scramble of IC card 5 after delay of data processing time is sent outRead in the IC card I/F part 6 (Step 504 of drawing 5)and it changes into a parallel signal via the RS-232C control section 30Transmit to FIFO memory 31 and FIFO memory 31Generating interruption to CPU13if data entersCPU13 transmits the key data for canceling the scramble which is contained in FIFO memory 31 by the program to the system memory 8 via the host bus 14 by the I/O-hardware-control part 32.

[0057]And the key data for canceling scramble is gone via the host bus 14It writes in the releasing scramble part 3 by the I/O-hardware-control part 32 (Step 505 of drawing 5)and the packet of the MPEG2 transport stream which required the scramble outputted from a digital-satellite-broadcasting tuner is canceled.

[0058]Thenuntil it becomes change of a channel or the end of viewing and listening (Step 506 of drawing 5)It returns to processing (Step 502 of drawing 5) of ECM receptionand ECM is written in an IC cardand from an IC cardkey data is taken overand a series of work of writing in the releasing scramble part 3 is repeatedand is performed. If it becomes change of a channel or the end of viewing and listeninga series of work of a releasing scramble will be ended.

[0059]As mentioned aboveif PID which performed the releasing scramble flow and in which the channel of paid broadcasting is contained is set as a filter as shown in drawing 5Since the DMA transfer of the packet of the image of which scramble was canceledor a sound is carried out to the system memory 8the program executed by CPUif the payload part of the packet in it is extractedthe image of MPEG 2 and PES (Packetized Elementary Stream) of each sound can be extracted.

[0060]Extracted PES is decoded by the program executed by CPUthe result of picture decoding is transmitted to the picture display part 10an image can be displayed on CRT15the result of voice decoding can be transmitted to the sound reproduction section 11and a sound can be sounded from the speaker 16.

[0061]

[Example]The above-mentioned embodiment of the invention is described below with reference to Drawings about one working example of this invention that it should explain still in detail.

[0062]Drawing 6 is a figure showing the composition of one working example of this invention. When the drawing 6 reference is carried outthe digital CS satellite reception part 71Receive and the broadcasting electric-wave which uses CS satellite which was based on the reply (Heisei 7(1995) July 24) in part with the parabolic antenna 1 as for the Telecommunications Technology Council consultation No. 74 by the digital CS satellite broadcasting tuner part 70. The QPSK demodulation and the error correction which return selection and the electric wave of a transponder to the original digital signal are performedand an MPEG2 transport stream is outputted. Control of a tuner is connected to a filter and the host bus control section 4 at this time.

[0063]Nextit lets the releasing scramble part 3 passand an MPEG2 transport

stream is transmitted to a filter and a host bus control section. The key data for canceling scramble is sent to the scramble control section 3 from a filter and a host bus control section.

[0064]A filter and the host bus control section 4It has an interface for communicating data in the IC card I/F (interface) part 6 for accessing IC card 5 for receiving the paid broadcasting of the broadcast which uses CS satellite which was based on the reply (Heisei 7(1995) July 24) in part as for the Telecommunications Technology Council consultation No. 74It connects with the PCI (Peripheral Component Interconnect) bus 75 of the personal computer 18and it is connected so that it can access from CPU13 of the personal computer 18.

[0065]The digital CS satellite reception part 71 for receiving the broadcast which uses CS satellite which it comes to constitute as mentioned aboveand which was based on the reply (Heisei 7(1995) July 24) in part as for the Telecommunications Technology Council consultation No. 74 is connected to PCI bus 75 of the personal computer 18.

[0066]The personal computer 18 processes data by North Bridge72 which generally controls CPU13PCI bus 75and the system memory 8Display a picture on CRT15 by the graphics subsystem 73 connected to PCI bus 75orMusic can be sounded to the speaker 16 by sound CODEC74 connected to PCI bus 75or it connects with NTT telephone line 76 by the modem section 12 connected to PCI bus 75and data communications become possible.

[0067]Nextoperation of one working example of this invention is explained in detail with reference to drawing 2 thru/or drawing 6.

[0068]Firstin the tuner part 70 of digital CS satellite broadcasting. Tuerssuch as a change of the transponder of CS satelliteare set up for the electric wave received with the parabolic antenna 1 by CPU13 of the personal computer 18QPSK demodulation and an error correction are performedand the transport stream of MPEG 2 is outputted.

[0069]At this timesince scramble is not canceled as for the channel of paid broadcastingin the case of paid broadcastingit changes into the MPEG2 transport stream which canceled scramble in the releasing scramble part 3. The key for canceling scramble at this time is controlled by CPU13 from the system memory 8 of the personal computer 18and sends out data to the releasing scramble part 3.

[0070]MPEG2 transport stream 39 outputted in the releasing scramble part 3 is the transport stream filter 33 (refer to drawing 2)and filters by ID of the packet beforehand set up by the program of CPU13 to carry out a filter.

[0071]Operation of a filter is explained more to details using drawing 3.

[0072]A filter looks at the 13-bit information which shows ID of the packet called PID of an MPEG2 transport streamIt is formed by the filter block 50 which comprises the comparator 52 which outputs "1" when the value of the register 51 with a data number of 13 bits which set up the value of PID which wants to filter the value of the PID beforehand by CPU13 is compared and it is in agreementand outputs "0" when inharmonious. At this timethe 16 filter blocks 50 are usedit has composition which carries out the filter of 16 PID simultaneouslyand logical sum is

taken for the output of a filter block by OR gate 53. It opts for operation of the filter of a packet according to the state of the signal Y outputted from OR gate 53. When the output signal Y is "0"a packet is disregardeda packet is discardedand when the signal Y is "1"a packet is transmitted to 512 bytes of FIFO memory 34. This operation is performed in the transport stream filter 33.

[0073]The DMA transfer of the data transmitted to FIFO memory 34 is carried out by the direct memory access control 35 to the system memory 8 of the personal computer 18. Drawing 4 is a figure showing the filter operation. As shown in drawing 4the packet of the same PID is extracted.

[0074]Since the filter only of the packet in which the packet transmitted to the system memory 8 had the demand by the program of CPU13 is carried outonly a packet needed will be transmitted to the system memory 8 by a program. Since the packet is continuing seeing the data transmitted to this system memory 8the program executed by CPU13 can do easily the work of the section formation returned to the original section.

[0075]If the destination address of the system memory 8 when transmitting by a DMA transfer is changed when a filter is carried out by 16 PIDit will become possible to transmit without losing the continuity of the same packet.

[0076]Nextoperation when receiving paid broadcasting is explained according to the flow chart of drawing 5.

[0077]When receiving paid broadcasting firstit is necessary to make a contract the offer origin of paid broadcasting a prioriand to write in EMM data to an IC card (Step 501 of drawing 5). The contract information of paid broadcasting is contained in this EMM datasince a broadcasting station will carry and send out EMM data to the transport packet of MPEG 2 using a satellite if a customer makes a contractby a programthe filter of the EMM data is carried out and it extracts it.

[0078]The extracted EMM data is sent out to 128 bytes of FIFO memory 31 via the I/O-hardware-control part 32 via PCI bus 75. The data from FIFO memory 31 is changed into serial data by the RS-232C control section 30and by setting out called a half duplex start-stopthe start bit 1the data bit 8even parityand 2 bits of guard time. EMM data is written in and put on IC card 5 through the IC card I/F part 6. Unless it does this workkey information for canceling scramble of IC card 5 cannot be read.

[0079]The ID information according to card individual included in IC card 5 is read in the IC card I/F part 6Change into a parallel signal via the RS-232c control section 30and it transmits to FIFO memory 31FIFO memory 31 will generate interruption to CPU13if data entersand CPU13 transmits the data which is contained in FIFO memory 31 by the program according to this interruption to the system memory 8 via PCI bus 75 by the I/O-hardware-control part 32.

[0080]The ID information of this IC card is beforehand set as the releasing scramble part 3 by the I/O-hardware-control part 32 via PCI bus 75. It is necessary to perform the above thing by initial setting beforehand.

[0081]NextECM data is received (Step 502 of drawing 5). Data required in order to extract the key for canceling the scramble of paid broadcasting from IC card 5 is

contained in this ECM dataand ECM dataSince a broadcasting station carries and sends out to the transport packet of MPEG 2 at the time when the broadcast is performed for every program of paid broadcasting using CS satelliteby a programthe filter of the ECM data is carried out and it is extracted.

[0082]The extracted ECM data is sent out to FIFO memory 31 via the I/O-hardware-control part 32 via PCI bus 75.

[0083]The data from FIFO memory 31 is changed into serial data by the RS-232C control section 30and is written in IC card 5 as ECM data through the IC card I/F part 6 by it (Step 503 of drawing 5).

[0084]Thensince the key data for canceling scramble of an IC card after delay of data processing time is sent outRead in the IC card I/F part 6 (Step 504 of drawing 5)and it changes into a parallel signal via the RS-232C control section 30When data enterstransmit to FIFO memory 31generate FIFO memory 31 to CPU13and interruption CPU13The key data for canceling the scramble included in FIFO memory 31 is transmitted to the system memory 8 via PCI bus 75 by the I/O-hardware-control part 32 by a program.

[0085]The key data for canceling scramble is gone via PCI bus 75It writes in the releasing scramble part 3 by the I/O-hardware-control part 32 (Step 505 of drawing 5)and the packet which the scramble of the MPEG2 transport stream outputted from a digital CS satellite broadcasting tuner required is canceled.

[0086]Thenuntil it becomes change of a channel or the end of viewing and listening (Step 506 of drawing 5)It returns to processing (Step 502 of drawing 5) of ECM receptionand ECM data is written in an IC cardand from an IC cardkey data is taken overand a series of work of writing in the releasing scramble part 3 is repeatedand is performed. If it becomes change of a channel or the end of viewing and listeninga series of work of a releasing scramble will be ended.

[0087]As mentioned aboveif PID which performed the releasing scramble flow and in which the channel of paid broadcasting is contained is set as a filter as shown in drawing 5since the DMA transfer of the packet of the image of which scramble was canceledor a sound is carried out to the system memory 8the program can extract the image of MPEG 2and PES of each soundif the payload part of the packet in it is extracted. Extracted PES is decoded by a programthe result of picture decoding can be transmitted to the graphics system 73an image can be displayed on CRT15the result of voice decoding can be transmitted to sound CODEC74and a sound can be sounded from the speaker 16.

[0088]Nexta 2nd embodiment of this invention is described with reference to drawing 7drawing 8and drawing 9.

[0089]In [if drawing 7 thru/or drawing 9 are referred to] this 2nd embodimentTo the filter block of a filter and the transport stream filter 33 (refer to drawing 8) of the host bus control section 4. Form two filters which extract only the picture of MPEG 2and an audio payload part from a packetand it goes via 512 bytes of transport bufferTransmit the output to MPEG2 decoder 20 (refer to drawing 7) of hardware constitutionsperform decoding of a picture and a soundand the output of the picture from MPEG2 decoder 20Without going via a host bus (PCI

bus)directlyit inputs into the picture display part 10and displays on CRT15and an audio output is inputted into the sound reproduction section 11and sounds a sound from the speaker 16.

[0090]Reference of drawing 7 connects the memory 19 to MPEG2 decoder 20 as a buffer for decoding.

[0091]When performing MPEG 2 decoding by hardware and drawing 9 is referred towith the transport stream filter 33. A program time reference value when it encodes by the broadcasting station side called "PCR" (Program Clock Reference) is extractedIn [latch the value by the latch 60load to the counter 64 counted up with the clock of MPEG2 decoder 20 when latched PCR changes a channel and there is by the first PCR simultaneouslyand] the subtractor 61The difference of PCR and the counter value which were latched is taken and this difference is changed into an analog signal with D/A converter (digital-analog converter) 62.

[0092]D/A converter 62 is adjusted so that central potential may be pointed outwhen difference is 0you raise potential at the time of positiveand the difference of the subtractor 61 makes it operate at the time of negativeso that potential may be lowered. It lets LPF(low pass filter) 63 pass so that it may not malfunctionwhen the output of D/A converter 62 has a large change of potentialand the oscillating frequency of a clock is inputted into the terminal for the frequency regulation of VCO(voltage controlled oscillator) 43 which can be changed delicately with control voltage.

[0093]VCO43 outputs the clock of MPEG2 decoder 20 and this clock is made to input also into the counter 64 of PCR.

[0094]Even if the clock outputted from VCO43 continues watching prolonged broadcast in order to operate so that the clock of the encoder by the side of a broadcasting station may be approachedit can abolish the buffer for transport overflowing or carrying out underflow.

[0095]By having had the above compositionit becomes [the time of liking to make load of a bus lightand] advantageous to make low processing performance of CPU13 of the personal computer 18.

[0096]Nexta 3rd embodiment of this invention is described with reference to drawing 10.

[0097]This 3rd embodiment applies this invention to the digital TV broadcasting by the terrestrial wave of the schedule by which near future broadcast is started. The composition of fundamental hardware is the same as said 2nd embodimentandbelowexplains a point of difference.

[0098]Although a terrestrial wave becomes the antenna 21 for terrestrial waves used in the ordinary home now although an antenna is a parabolic antenna at the time of satellite broadcastingand the tuner part 2 is also changed into digital terrestrial waves from the object for digital satellite broadcastingSince the output of the tuner part 2 serves as an MPEG2 transport streamsubsequent composition becomes equivalent.

[0099]Since terrestrial digital TV broadcasting is not the present screen size and

the screen size of the high resolution of a Hi-Vision class is assumedAs for the MPEG2 decoder at that timewhat decoding of MP@HL (Main Profile at High Level) can do is needed.

[0100]

[Effect of the Invention]As explained aboveaccording to this inventionthe effect of the following description is done so.

[0101]The 1st effect of this invention is that the required packet of an MPEG2 transport stream is made on the system memory of a computer as for transmission. Therebyprocessing of a packet becomes easy by CPU of a computer.

[0102]The Reason carries out the filter of the packet of an MPEG2 transport stream to the receiving part of digital broadcasting by PID in this inventionAfter inputting into a FIFO memoryit is because it constituted so that a DMA transfer could be performed to a system memory via the host bus of a computer by a DMA controller.

[0103]The 2nd effect of this invention is that reading and writing of an IC card and control of release of scramble can control by CPU of a computer when receiving paid broadcasting. This sends out ECM data to an IC card by CPU of a computerCPU of a computer can receive now the key data for canceling scramble from an IC cardand CPU of a computer can write in data for the key data for the releasing scramble to a releasing scramble part.

[0104]The Reason transmits data to a FIFO memory by an I/O-hardware-control part via a host bus from the system memory of a computer in this inventionAfter changing into a serial signal by a RS-232C control sectionit carries out as [perform / to an IC card / from an IC card I/F part / transmission of data]And the data of an IC card is changed into a parallel signal by a RS-232C control section via IC card I/FTransmit data to a FIFO memoryand the data is constituted so that data may be sent to a system memory via a host bus by an I/O-hardware-control partIt is because the data of the system memory was constituted so that data could be written in to a releasing scramble part via a host bus by an I/O-hardware-control part.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]It is a figure showing the system configuration of an embodiment of the invention.

[Drawing 2]It is a block diagram showing the composition of the filter in an embodiment of the inventionand a transport control section.

[Drawing 3]It is a figure for explaining the constituting principle of the filter in an embodiment of the invention.

[Drawing 4]It is a figure for explaining operation of the filter in an embodiment of the invention.

[Drawing 5]It is a flow chart which shows the process flow which cancels the

scramble of paid broadcasting in an embodiment of the invention.

[Drawing 6]It is a figure showing the system configuration of one working example of this invention.

[Drawing 7]It is a figure showing the system configuration of a 2nd embodiment of this invention.

[Drawing 8]It is a block diagram showing the composition of the filter in a 2nd embodiment of this inventionand a transport control section.

[Drawing 9]It is a figure for explaining operation of the VCO control part in a 2nd embodiment of this invention.

[Drawing 10]It is a figure showing the system configuration of a 3rd embodiment of this invention.

[Drawing 11]It is a figure showing the composition of the conventional system.

[Description of Notations]

1 Parabolic antenna

2 Digital-satellite-broadcasting tuner part

3 Releasing scramble part

4 A filter and a host bus control section

5 IC card

6 IC card I/F part

7 Digital CS satellite reception part

8 System memory

9 Control section

10 Picture display part

11 Sound reproduction section

12 Modem section

13 CPU

14 Host bus

15 CRT (display device)

16 Speaker

17 Telephone line

19 Memory

20 MPEG2 decoder

21 Terrestrial antenna

30 R-232C control section

31 FIFO memory

32 I/O-hardware-control part

33 Transport stream filter

34 FIFO memory

35 Direct memory access control

36 Digital-satellite-broadcasting tuner control signal

37 IC card I/F data / control signal

40 Host bus I/F

42 VCO control part

43 VCO

50 Filter block
51 The PID register over which a filter is covered
52 Comparator
53 OR gate
60 Latch
61 Subtractor
62 DAC
63 LPF
64 Counter
70 Digital CS satellite broadcasting tuner part
71 Digital-CS-broadcasting receive section
72 North Brigde
73 Graphics subsystem
74 Sound CODEC
75 PCI bus
76 NTT telephone line
101 Satellite antenna dish
102 Digital-satellite-broadcasting tuner part
103 Releasing scramble part
104 DRAM
105 Transport stream decoder
106 MPEG2 decoder
107 SDRAM
108 Video encoder
109 Audio DAC
110 System bath
111 A remote control/panel control part
112 16bit microcomputer
113 ROM
114 DRAM
115 IC card
116 IC card I/F part
117 Modem
118 Network control
119 Digital satellite broadcasting receiver (IRD)